



# Volunteer Lake Assessment Program Individual Lake Reports

## FRENCH POND, HENNIKER, NH

### MORPHOMETRIC DATA

Watershed Area (Ac.):	486	Max. Depth (m):	12.3	Flushing Rate (yr <sup>-1</sup> )	1.2
Surface Area (Ac.):	41	Mean Depth (m):	4.3	P Retention Coef:	0.65
Shore Length (m):	1,600	Volume (m <sup>3</sup> ):	727,500	Elevation (ft):	543

### TROPHIC CLASSIFICATION

Year	Trophic class
1997	EUTROPHIC
2006	EUTROPHIC

### KNOWN EXOTIC SPECIES


The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at [www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm](http://www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm)

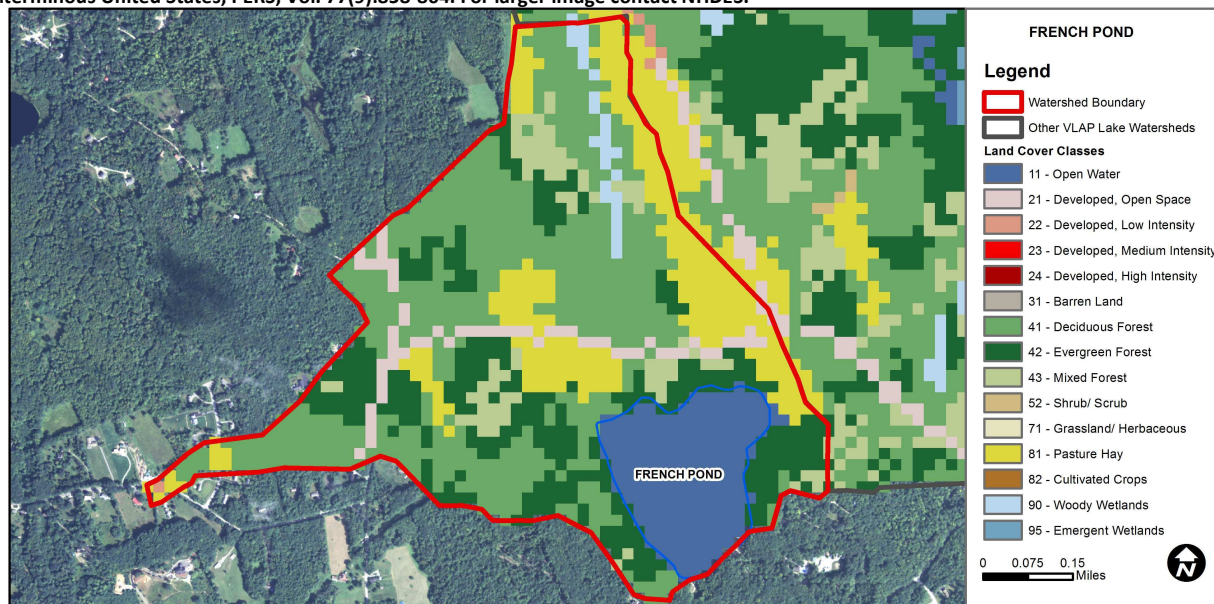
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Slightly Bad	The calculated median is from 5 or more samples and is > indicator and the chlorophyll a indicator is exceeded.
	pH	Bad	>10%, with a minimum of 2, samples exceed criteria, with 1 or more by a large margin.
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Chlorophyll-a	Slightly Bad	The calculated median is from 5 or more samples and is > indicator.
Primary Contact Recreation	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Bad	There are >10% of samples (minimum of 2), exceeding indicator with one or more samples considered large exceedance.

### BEACH PRIMARY CONTACT ASSESSMENT STATUS

FRENCH POND - PUBLIC ACCESS	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
FRENCH POND - PUBLIC ACCESS	Cyanobacteria	Slightly Bad	Cyanobacteria bloom(s).

### WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	12.4	Barren Land	0	Grassland/Herbaceous	0
Developed-Open Space	4.24	Deciduous Forest	38.7	Pasture Hay	16.03
Developed-Low Intensity	0.07	Evergreen Forest	20.41	Cultivated Crops	0
Developed-Medium Intensity	0	Mixed Forest	5.65	Woody Wetlands	1.77
Developed-High Intensity	0	Shrub-Scrub	0	Emergent Wetlands	0



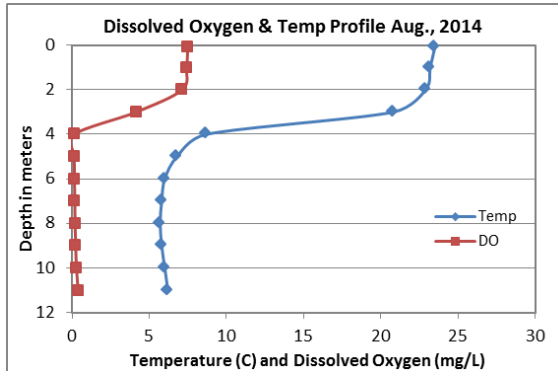
# VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

## FRENCH POND, HENNIKER

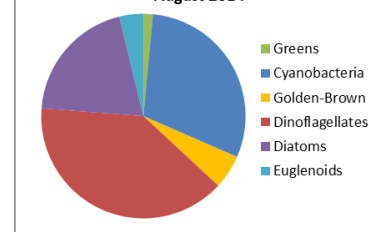
### 2014 DATA SUMMARY

#### OBSERVATIONS AND RECOMMENDATIONS (Refer to Table 1 and Historical Deep Spot Data Graphics)

- **CHLOROPHYLL-A:** Chlorophyll levels were elevated in August and approaching levels indicative of an algal bloom. However, August chlorophyll was drastically less than those levels measured in 2013. Historical trend analysis indicates significantly increasing (worsening) chlorophyll since monitoring began. The pond has experienced cyanobacteria blooms in the past and residents should be on alert for the presence of a cyanobacteria bloom or surface scum in the future.
- **CONDUCTIVITY/CHLORIDE:** Deep spot and tributary conductivity remained elevated and greater than the state median. Historical trend analysis indicates significantly increasing (worsening) epilimnetic (upper water layer) conductivity since monitoring began.
- **E. COLI:** E. coli levels at the Campground Swim Area were low and much less than the state standard of 88 cts/100 mL for public beaches.
- **TOTAL PHOSPHORUS:** Epilimnetic phosphorus was elevated and much greater than the state median. Historical trend analysis indicates significantly increasing (worsening) epilimnetic phosphorus since monitoring began. Metalimnetic (middle water layer) and hypolimnetic (lower water layer) phosphorus levels were also elevated and much greater than the average for NH lakes. The elevated hypolimnetic phosphorus levels were a result of phosphorus being released from a thick layer of organic matter on the lake bottom when dissolved oxygen levels decrease below 1.0 mg/L. This process is called internal phosphorus loading. Cow Brook phosphorus levels were greatly elevated in August following a significant rain event and have been elevated in more recent years. French Brook phosphorus levels were elevated but lower than average for that station. Launch Brook phosphorus levels were elevated and within average range for that station.
- **TRANSPARENCY:** Pond transparency was low and much worse than the state median. The 2014 transparency was much better than that measured in 2013 due to the decreased algal growth. However, historical trend analysis indicates significantly decreasing (worsening) transparency since monitoring began.
- **TURBIDITY:** Epilimnetic and Outlet turbidity were slightly above average for NH lakes likely due to algae in the water column. Metalimnetic and hypolimnetic turbidity were greatly elevated due to algal growth in the metalimnion and the accumulation of organic compounds in hypolimnetic waters during severely anoxic conditions. Cow Brook and French Brook turbidities were low. Launch Brook turbidity was slightly elevated.
- **PH:** Epilimnetic and hypolimnetic pH levels were within the desirable range of 6.5–8.0 units however have historically fluctuated above and below this range. Historical trend analysis indicates highly variable epilimnetic pH since monitoring began.
- **RECOMMENDED ACTIONS:** Increase monitoring frequency to three times per summer, typically June, July and August, to better assess seasonal and historical water quality trends and decrease variability between annual data sets. The elevated internal phosphorus load combined with elevated tributary phosphorus loading contributes to elevated algal and cyanobacteria growth. Efforts should be made to reduce phosphorus loading from tributaries. It is also recommended to communicate the water quality conditions of the pond to the N.H. Fish and Game Department in regards to fish stocking. The dissolved oxygen levels cannot support cold-water fish for an extended period. Fish then die and fall to the bottom of the pond adding to the thick organic layer which depletes dissolved oxygen and releases phosphorus that promotes cyanobacteria blooms.



French Pond Algal Population August 2014



**NH Water Quality Standards:** Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.

**Chloride:** > 230 mg/L (chronic)

**E. coli:** > 88 cts/100 mL – public beach

**E. coli:** > 406 cts/100 mL – surface waters

**Turbidity:** > 10 NTU above natural level

**pH:** between 6.5-8.0 (unless naturally occurring)

**NH Median Values:** Median values for specific parameters generated from historic lake monitoring data.

**Alkalinity:** 4.9 mg/L

**Chlorophyll-a:** 4.58 mg/m<sup>3</sup>

**Conductivity:** 40.0 uS/cm

**Chloride:** 4 mg/L

**Total Phosphorus:** 12 ug/L

**Transparency:** 3.2 m

**pH:** 6.6

Station Name	Table 1. 2014 Average Water Quality Data for FRENCH POND								
	Alk. mg/l	Chlor-a ug/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m		Turb. ntu	pH
						NVS	VS		
Epilimnion	11.4	13.29	102.0		23	1.93	2.38	2.41	6.93
Metalimnion			107.0		57			5.58	6.27
Hypolimnion			138.0		178			18.2	6.55
Campground Swim Area				10					
Cow Brook			156.0		131			1.14	6.82
French Brook			204.5		32			0.82	7.02
Launch Brook			69.0		52			3.32	6.91
Outlet			103.0		17			2.41	6.81

#### HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Worsening	Data significantly increasing.
pH (epilimnion)	Stable	Trend not significant; data highly variable.	Transparency	Worsening	Data significantly decreasing.
			Phosphorus (epilimnion)	Worsening	Data significantly increasing.

